

BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA
DOCKET NO. 2021-66-A

June 11, 2021

IN RE:)	
)	
South Carolina Office of Regulatory Staff's)	
Motion to Solicit Comments from Utilities and)	INITIAL COMMENTS
Other Interested Stakeholders Regarding)	
Measures to Be Taken to Mitigate Impact of)	
Threats to Safe and Reliable Utility Service)	
_____)	

I. Introduction

The South Carolina Public Service Authority (“Santee Cooper”) is committed to its long-term mission of improving the quality of life for all South Carolinians by continuing to implement industry best practices in utility operations and consistently looking for ways to improve our workforce and system reliability. As South Carolina’s largest power provider and the ultimate source of electricity for approximately two million people across the state of South Carolina, we are grateful for the opportunity to participate in this important proceeding, the impetus of which was the February 2021 extreme cold weather event which severely impacted the Midwest and South Central States, particularly Texas. Santee Cooper views this study as an important opportunity not only to report on the steps Santee Cooper has historically taken and will continue to take to mitigate the negative impacts of extreme cold weather on meeting peak customer demand, but also to learn from the experience of other utilities participating in this process. Santee Cooper commends the leadership of this State for taking steps to ensure South Carolina’s readiness and resiliency

if faced with extreme winter weather similar to what we saw in Texas.

Santee Cooper has historically maintained reliable service through extreme cold weather events, most recently the January 2014 Polar Vortex where Santee Cooper was able to maintain service to all of its firm load, while at the same time identify from that event opportunities for future improvement. Those opportunities included taking incremental steps to provide a higher level of protection to critical systems, as well as continuously improving mitigation and response planning in the transmission and distribution systems. With our proven track record for reliability in mind, Santee Cooper has provided the information and assessments requested by the Public Service Commission of South Carolina in its March 10, 2021 Directive.

II. Information and Assessments Requested by the Commission

Identification of Threats to Utility Service

Based upon its assessment of potential threats¹ to the Santee Cooper system, Santee Cooper has broadly identified the following potential threats which require further evaluation of conceivable impacts and measures that might be taken to mitigate those impacts:

- ✓ Extreme Cold Weather
- ✓ Ice Storms
- ✓ Extreme Hot Weather
- ✓ Flooding
- ✓ Hurricanes
- ✓ Pandemics to the extent they impact Santee Cooper's workforce and supplies
- ✓ Cyber Attacks on Utility Systems
- ✓ Physical Attacks on Utility Systems
- ✓ Earthquakes

¹ "Threats are anything that may destroy, damage, or disrupt utility service." Pub. Serv. Comm'n of S.C. Comm'n Directive at 1 (March 10, 2021).

Given the catalyst for this investigation, however, Santee Cooper will limit the scope of these comments to extreme cold weather and ice storms (collectively “Extreme Cold Weather”), although it is open to fully exploring with the Commission the broader array of threats to the Santee Cooper system.

Identification of the Impacts to Utility Service

Santee Cooper has identified the following impacts to utility processes, systems, infrastructure, and end-user customers from Extreme Cold Weather:

Generation Impact: Santee Cooper utilizes a combination of generation resources and off-system wholesale market purchases to provide reliable power and meet the energy needs of its customers. Winter weather, in particular Extreme Cold Weather extending for multiple days, complicated by snow, ice, sleet, or freezing rain has the potential to negatively impact generation resources. The impacts could range from a small derating to a full loss of availability from these resources. Loss of generation resources exposes Santee Cooper to energy market constraints and conditions and could impact power supply equilibrium whereby supply would not meet demand.

Delivery of Power Impact: The facility ratings of the components of the Santee Cooper transmission system limit the amount of power that can flow across that system. During Extreme Cold Weather, the transmission system is operated closer to the facility ratings than what would be the case during normal conditions. This, in turn, would limit the operational flexibility to import power from off-system and maintain system and customer reliability.

Icy winter conditions may impact the transmission system similar to a winter storm. However, when ice accumulates on trees and distribution lines, the customer’s energy

demand may suddenly fall through the interruption of service on the impacted distribution facilities. With the loss of load, a significant challenge would be balancing generation resources with the lower than expected load. If the load reaches values below the aggregate of the minimum capabilities of the generating resources, generating units would be taken offline.

The distribution system is designed to operate at expected peak temperatures and to handle the loss of a substation transformer at peak conditions. Extreme peak conditions, including extended days of extreme peak conditions, would force the system to operate closer to the facility ratings. Recovering from outage events, including effects of cold load pickup, becomes more challenging.

Santee Cooper Employee Impact: During Extreme Cold Weather, the risk of physical injury to Santee Cooper employees would increase as a result of the adverse weather conditions. The unavailability of employees because of physical injury as well as the precautions taken to mitigate the likelihood of physical injury may negatively impact productivity of the Santee Cooper workforce relative to normal conditions.

End-Use Customer Impact: During Extreme Cold Weather, the unavailability of generation resources from the Santee Cooper system or from the wholesale market may negatively impact the ability of Santee Cooper to meet customer energy demands. Customer impacts could be experienced due to any weather-related issue along the energy supply system starting with generating resources and moving through to the customer via power delivery systems. Depending on the customer class and unique energy needs, impacts can be both loss of reliability and increased energy costs.

Assessment of Vulnerabilities

Santee Cooper describes below its assessment of the extent to which utility systems and infrastructure are vulnerable² from Extreme Cold Weather:

Generation Impact: Santee Cooper's generating stations are designed to withstand the regional climate by using best engineering practices of incorporating historical climate data in the design basis. It is acknowledged, however, that certain events can exceed historical averages and temperature minimums. It is also imperative that generating stations maintain systems and components in good health to sustain cold weather resiliency. Even with a good design and maintenance program an Extreme Cold Weather event could have an adverse impact on instrumentation, process systems, coal feeding systems, and the supply chain of generating stations. It could also impact natural gas and power purchase availability.

A. Instrumentation

"Instrumentation" refers collectively to the various instruments and associated appurtenances that are used to measure and control the processes of electric power generation. The instrument is the 'meter' where the information is processed into data. For example, steam pressure in a pipe is monitored with a pressure instrument, and a signal is supplied by the instrument to the plant's control system for operator indication, automatic control functions, and safety supervisory actions. A 'sensing line' is an associated appurtenance consisting of a small tube that connects the main process with the instrument. In the example above with the steam pipe, the sensing line would be a small stainless-steel tube that carries steam from the main pipe

² "Vulnerabilities are weaknesses within the utility systems, processes or infrastructure." *Id.*

to the pressure instrument. The main vulnerability during Extreme Cold Weather is that the sensing line can freeze, which leads either to a loss of information to the process in question or to the creation of inaccurate information, which might initiate a signal to trip the equipment or the unit. The sensing lines are weak points because they are small diameter tubes often made of stainless steel and often carry a fluid prone to freezing at temperatures below 32°F (e.g. steam, water, air). Generating stations rely on critical instrumentation sensing lines for the safe control of power plant processes. Frozen instrumentation can lead to reports of false system conditions. The responses to these false indications are mitigated by placing the processes in a safe state, either automatically through control systems or remedial action by unit operators. The outcomes of these safety responses can vary from a small percentage loss of net output to total loss of output from a generator. Santee Cooper's response to this vulnerability is described later.

B. Process Systems

Generation stations consist of complex systems of fluids, chemicals, steam, water, and bulk materials that could be impacted by extreme cold temperatures. When exposed to extreme cold temperatures, intensified by windchill and moisture, conduits of process systems (e.g., water lines) may freeze. Frozen process systems could impact the output of the generating stations, varying from a small percentage loss of net output to total loss of output from a generator. Santee Cooper's response to this vulnerability is described later.

C. Coal Feeding Systems

During Extreme Cold Weather, especially when complicated by accompanying moisture, coal could freeze into large lumps and impede the natural flow of fuel to coal-fired boilers through reclaim systems. The boilers create steam from water by using the heat generated from the combustion of coal. The produced steam from the boiler is sent to a turbine-generator set to generate electricity. Therefore, coal supply issues could impact the output of coal-fired generating stations, varying from a small percentage loss of net output to total loss of output from a generator, because the boiler would not be supplied with the necessary fuel for the combustion process. Santee Cooper's response to this vulnerability is described later.

D. Supply Chains

Transportation routes that are impassible because of snow or ice accumulation for several days pose significant threats to the loss of generation resources if ample stockpiles have not been maintained. Generating stations carry inventory of critical commodities, including solid fuel (e.g. coal), fuel oil, hydrogen, and anhydrous ammonia. During Extreme Cold Weather, the normal consumption of these commodities can increase due to increased load demand or due to abnormal operations. An enduring supply chain disruption could severely impact multiple units simultaneously at any given location. The impacts could vary from a small percentage loss of net output to total loss of output from a generator or multiple generators. Santee Cooper's response to this vulnerability is described later.

E. Natural Gas Availability

During Extreme Cold Weather that impacts large areas of the production fields from

Pennsylvania to Texas and large areas of demand from New York to Florida, natural gas supply could be curtailed due to freezing instrumentation at supply well heads as well as increased demands on this fuel source. Santee Cooper's response to this vulnerability is described later in the comment.

F. Power Purchase Availability

During Extreme Cold Weather, the ability of Santee Cooper to purchase needed off-system energy could be impacted because off-system generating units may be unavailable for many of the reasons described, above, as well as because of an increased market demand for such resources. Santee Cooper's response to this vulnerability is described later.

Delivery of Power: Energy demands resulting from Extreme Cold Weather could require that Santee Cooper bring all available generating resources online to meet that demand. Santee Cooper's transmission system can support this need, but with limited reserve margins to address contingencies especially on interfaces between Santee Cooper and neighboring utility systems. Since Extreme Cold Weather typically affects broad geographical regions, the transmission systems of neighboring utilities may also be operating near operating limits. Operating transmission systems near reliability constraints limits the amount of energy that can be imported from the market. Events, such as the loss of a generating unit or loss of key transmission facilities, could result in interruption of service to non-firm and firm customers depending on the energy market availability.

During Extreme Cold Weather that includes ice accumulation, the system may experience low loads due to outages on distribution facilities. Forecasting the amount of load for the system during such events is a difficult and uncertain process. Due to the

unknown load impact, generation resource capacities may exceed the energy demands. Balancing generation demands, especially at lower generator limits, to accommodate the lower loads is a significant challenge.

Customer Impact: Under Extreme Cold Weather, the loss of internal resources, market resources, or facilities could negatively impact Santee Cooper's ability to meet customer demands at a low price point or synchronously; however, customer demands are often segmented by type and some types are interruptible in extreme conditions. The Industrial class customers' load consist of firm and non-firm components. During extreme events, industrial non-firm load could be economically curtailed first to mitigate the energy demand and match resources to load. If load and resource balancing were not achieved, "physical" curtailments could be implemented resulting in a physical loss of service to industrial customers' non-firm load. Santee Cooper's response to this vulnerability is also described later.

Santee Cooper Employee Impact: The impact to employees is multifaceted and includes the following:

- ✓ Impacts on productivity due to disruptions to the fuel supply needed for fleet vehicles and equipment.
- ✓ Impacts on availability resulting from difficulties in traveling from home to the office or jobsites.

Assessment of Risks to Utility Service

Santee Cooper will next describe its assessment of the risks to utility service as a result of the loss, damage or destruction of key assets and resources as well as the factors that could limit the supply of generated electric energy over an extended period of Extreme Cold Weather.

Generation: Santee Cooper will now examine this question from the perspective of instrumentation, process systems, coal feeder systems, and supply chains at generating stations.

A. Instrumentation

Those instrumentation sensing lines that are enclosed within buildings or structures have a low likelihood to freeze due to cold weather. In contrast, sensing lines installed outside of enclosures are at a greater risk to freezing in extreme cold temperatures because they are directly exposed to the elements. The likelihood of freezing is almost certain for sensing lines, which are exposed to the elements, unless mitigating actions are taken. Santee Cooper has identified sensing lines installed outside of enclosures and has mitigated the likelihood of these lines freezing by insulating and heat trace taping.

B. Process Systems

Much like instrumentation sensing lines, process systems exposed to the elements are at a greater risk to freezing than those enclosed within facilities. Risk of freezing is also higher depending upon the size of conduits, freezing point of materials, and flow of the material through the system. The likelihood of the freezing of process systems exposed to the elements is high unless mitigating actions are taken. Santee Cooper has identified all process systems installed outside of facilities and has mitigated the likelihood of these process systems freezing by insulating and heat trace taping.

C. Coal Feeder Systems

There is a low likelihood of coal freezing to the point of causing material handling issues, although when freezing temperatures are combined with wet weather, then the

likelihood of freezing increases. Mitigating actions can reduce the impact and likelihood of these events. Santee Cooper uses several mitigation techniques to prevent coal from clustering and clogging the coal feeder system.

D. Supply Chain Disruptions

A supply chain disruption is unlikely due to mitigating actions taken by generating stations in preparation for winter weather events. Also, the state, county, and other local agencies dispatch resources across the state to keep open roadways during these types of events. It is unlikely that we would see reduced coal or natural gas supply due to freezing conditions, but there is a slight risk of supply disruptions if the conditions are particularly extreme in the multiple supply areas, which are located throughout the country for both coal and natural gas. It is similarly unlikely that purchased power would not be available, since Santee Cooper is directly interconnected to five utilities from which power could be purchased as well as indirectly to multiple utilities within the Eastern Interconnection.

Delivery of Power Impact: Resources used to meet the customer energy demands consist of two key categories: system resources and the energy market. With Extreme Cold Weather, Santee Cooper typically relies less on the resources available in the energy market and more on system resources since the loss of a system resource is unlikely during such an event. With that said, Santee Cooper has plans and procedures in place to mitigate such losses should they occur. Although, the energy market unavailability is unlikely, the amount of energy that can be imported and delivered to the end-user during Extreme Cold Weather may be limited by transmission availability.

Ongoing maintenance of rights-of-way and transmission and distribution lines help ensure system reliability. Many of Santee Cooper's transmission and distribution lines are installed overhead and therefore are subjected to vegetation interferences. Accumulated ice on vegetation causes vegetation to sag, break and eventually come into contact with the lines thereby resulting in outages and a reduction in energy demands. The line outages reduce on-line generation resources demand to balance the reduced load.

Customer Impact: During Extreme Cold Weather that results in the loss, damage, or destruction of key assets and resources which limits the supply of generated electric energy over an extended period of time could result in increased market purchase volumes to meet customer demands. Extremely high import volumes could be restricted due to interface capability and pricing would be subject to market dynamics more so than if Santee Cooper supplied the energy. Santee Cooper has a plethora of strategies that have been deployed during previous winter storms that have successfully mitigated impacts to customer's costs; including but not limited to: calling on customers to peak-shave, declaring additional on-peak hours, asking renewable resources to run harder over the peaks, and running hydro units continuously to avoid manual adjustments.

Employee Impact: Employees are expected to be available in the event of a power system emergency, including Extreme Cold Weather. If forecast conditions indicate potential travel hazards, essential employees are housed in nearby hotels, in their respective crew quarters, or generating stations. Additional employees may be sent home with four-wheel drive fleets and dispatched from their homes.

Identification of Resiliency Solutions

Santee Cooper has developed detailed plans to anticipate, prepare for, adapt to, withstand, respond to, and recover quickly from service disruptions. These plans, including cost impacts to customer bills, are described in the sections below.

Corporate: In preparation for Extreme Cold Weather, Santee Cooper's Corporate Incident Management Team (CIMT) is activated to provide oversight and coordination among internal and external stakeholders. CIMT's support includes assisting in acquiring external resources and material to support potential restoration efforts. The CIMT also facilitates logistics support such as meals and lodging for internal crews and support contractors.

Generation: Each Santee Cooper generating station is designed to operate at a certain ambient temperature based on best engineering practices and historical ambient temperatures at its location. Each station has a unique and comprehensive winter weather preparedness plan, consisting of checklists for activities that are conducted pre-season, during winter season, and in the midst of Extreme Cold Weather. These plans are reviewed and updated annually to include lessons learned from previous seasons. Table-top drills are conducted to exercise and test the plans. These activities consist of maintaining heat tracing circuits, topping off critical supply inventories, executing special operating plans, providing additional personnel coverage, placing space heaters in critical instrumentation areas, manually thawing process systems, and other steps to maintain the generating station at maximum capacity.

A. Instrumentation

Santee Cooper employs heat tracing circuits on critical instrumentation and associated sensing lines to prevent the lines from freezing. Heat tracing is a controlled system of resistive elements run along pipes and vessels that heats up when electricity passes through it. Temperatures of the pipe and vessels are maintained at setpoints above freezing even as the ambient temperatures drop. These heat tracing circuits are checked before every winter season and maintained during the season. During Extreme Cold Weather, these circuits receive additional oversight and monitoring to validate their operation and effectiveness. The most critical instrumentation has been enclosed by either permanent or temporary enclosures. Additional precautions are taken by placing space heaters directly on these instruments and sensing lines to ensure continuous operation.

B. Process Systems

Much like instrumentation, most critical process systems that transport fluids are protected from Extreme Cold Weather with the same methods. Process systems that move bulk materials are subject to special operating procedures during Extreme Cold Weather to ensure continuous operation.

C. Coal Handling Systems

During Extreme Cold Weather events, coal handling systems run continuously to mitigate the effects of freezing coal. In addition, the stations continuously keep the coal bunkers “topped off” or at full capacity in the event coal supply issues occur. When the bunkers are topped off, the units can operate continuously for several hours until coal supply can be resumed.

D. Supply Chains

Santee Cooper monitors impending weather events and top-off critical supplies and commodities for continuous operation of the units. Coal: Santee Cooper maintains adequate coal stockpiles to mitigate the risk of supply chain disruptions. Natural Gas: Santee Cooper uses The Energy Authority (“TEA”) to purchase natural gas for consumption and TEA coordinates with multiple counterparts who supply from multiple areas including natural gas storage facilities which all serves to mitigate supply risks. Hourly coordination calls, between TEA and several key areas within Santee Cooper, are held to determine requirements and availability prior to and during extreme weather events. The integrity of the pipeline to our natural gas facility has never been at risk during an extreme weather event; the pipeline company has a system of redundancies and looping which maintains the integrity of that system. Santee Cooper uses financial hedge contracts to manage price risk as well as physical delivered gas contracts when economically feasible and has a service agreement with the Transco pipeline for sufficient capacity to serve the natural gas plant’s unit configurations ratably each day. TEA coordinates additional pipeline capacity daily as needed. Purchased Power: Santee Cooper is interconnected directly to five utilities from which power could be purchased as well as indirectly to multiple utilities along the eastern interconnection. Market power can be purchased hourly or days in advance to provide reliability, as well as a measure of price certainty. Santee Cooper actively assesses diversity in its own generation fleet and there are numerous neighboring utilities that also have fleet diversity including dual fuel capability at various generating stations; power

purchase agreements with those utilities can be used to mitigate risks to extreme cold weather events.

Delivery of Power: In preparation for Extreme Cold Weather, Santee Cooper coordinates with the VACAR South Reliability Coordinator and neighboring utilities to maintain reliability during the event. As part of the preparations, conservative operations are established limiting all transmission and generation work to critical needs only. Internal coordination meetings are held to review procedures and staffing plans.

Santee Cooper performs a winter seasonal assessment each year to stress test the system for extreme loading events. Through this process, mitigation plans are developed, reviewed, and published. These assessment and mitigation plans are incorporated into the System Operator fall classroom and simulator training to prepare them for potential scenarios.

Santee Cooper's transmission and distribution systems are designed under the applicable wind and ice loading standards of the National Electrical Safety Code (NESC): Rule 250B (Combined Ice and Wind District Loading); Rule 250C (Extreme Wind Loading); and 250D (Extreme Ice with concurrent Wind Loading)³. Rule 250D ensures our transmission system can withstand the effects of extreme ice on our structures and conductor at specified wind speeds. The ice thickness and wind speed, at which Santee Cooper designs, varies depending on geographical location as defined by the NESC.

Typically, with proper planning studies (short-term, long-term, protection and contingency), the system is designed to eliminate violations of the NESC standards during peak conditions. Extreme or rare events may test the limits. The Distribution Planning unit

³ See Accredited Standards Comm. C2, IEEE, NATIONAL ELECTRICAL SAFETY CODE (NESC) (2017 ed. 2016).

performs biannual contingency studies. Distribution Planning analyzes and documents the specific circuit switching steps required to recover from a feeder and/or substation transformer outage at both winter and summer peaks. System hardening, to include line and system upgrades as well as load shifting, is recommended when the study indicates possible non-compliance with the NESC standards.

Customer Impact/Financial impact: Santee Cooper utilizes all resources to meet projected demand for all customer classes and manages customers relative to firmness of power. Santee Cooper coordinates with large industrial customers who have specific requirements in order to minimize monetary impact if a curtailment is expected due to a weather event. System operations focus on providing customers low cost power and use model algorithms to determine the best mix of resources to use each hour. Natural gas hedge plans are initially based on long term model views but are shored up with month-ahead stochastic models that incorporate most recent data about load and pricing/availability of all resources available to Santee Cooper. In an attempt to keep natural gas pricing as stable as possible, hedge plans seek to at least price-protect the base amount of firm pipeline capacity under the service agreement for the natural gas plant, which is enough to run various configurations of the units at that plant each day. The natural gas supply can be utilized ratably during the day to coincide with unit requirements based on system peaks. Santee Cooper, through TEA, administers purchase power contracts to ensure suppliers are taking necessary measures to provide reliable power to Santee Cooper and pursues market purchase power opportunities for upcoming extreme events to mitigate reliability and financial risk to all our customer classes. Santee Cooper coordinates with SEPA, the United States Army Corps of Engineers (USACE), and with

customers who have load-side resources to optimize those resources as well. Although there have been instances in winter storms where certain hours or days have been extreme, those instances have been prefaced and followed by mild weather that has served to tamp down the price impact of those storms. During non-rate-lock periods, Santee Cooper's fuel adjustment clause provides for use of system averages in passing fuel costs along to customers and there are various programs that offer customers assistance in paying their electric bills. Santee Cooper, via cross departmental teams, tracks and assesses fuel costs closely and is very sensitive to maintaining or lowering costs.

If a winter storm event impacts a county containing Santee Cooper's assets and a Federal Declaration is issued from the President for that county, then Santee Cooper, as a public agency, is eligible to receive reimbursement from the Federal Emergency Management Agency (FEMA) for qualifying restoration expenses⁴. All federal checks issued in response to FEMA claims go through the South Carolina Emergency Management Division (SCEMD). SCEMD acts as a pass through for all public agencies and then matches the seventy-five percent federal claim disbursement with the state's twenty-five percent share. Historically, Santee Cooper has received only seventy-five percent of the eligible funding for FEMA declared events because we choose not to ask for the twenty-five percent share that comes from state taxpayer funding. Santee Cooper is also eligible for FEMA qualifying mitigation funding. Again, Santee Cooper accepts only federal funding for mitigation projects and does not accept state taxpayer funding for mitigation projects.

⁴ See 42 U.S.C § 5172.

Employees: Santee Cooper has an Emergency Action Plan (EAP) for power system emergencies which is reviewed and updated annually. The EAP provides for a coordinated and efficient response for power system disasters with large numbers of outages at an operational level. It also clearly defines individual responsibilities and the chain of command for events.

The EAP committee conducts a tabletop exercise or emergency response workshop annually. Where possible, some units perform a live exercise of their specific responsibilities annually. The EAP is maintained by a representative committee with oversight from the Corporate Incident Management Team (CIMT).

The CIMT exists to coordinate the emergency response at an organizational level. In general, it coordinates internal resources and responds to requests for internal and external assistance. It provides for resource procurement and allocation based on priority and logistical support for restoration efforts (meals, employee and contractor lodging, laundry, etc.) It also functions as a liaison with State and Federal government, FEMA, and outside stakeholders and customers.

Identification of Other Federal and State Reliability Requirements

Broadly speaking, other federal, state and local reliability and resilience requirements applicable to Santee Cooper include:

- ✓ NERC Reliability Standards
- ✓ VACAR South Reliability Agreement
- ✓ VACAR Reserve Sharing Group (VRSG)
- ✓ Regional Equipment Sharing for Transmission Outage Restoration (RESTORE)
- ✓ South Carolina Regional Transmission Planning (SCRTP)
- ✓ SERC NTSG and LTSG Reliability Assessment Studies
- ✓ Eastern Interconnection Planning Collaborative (EIPC)
- ✓ Carolinas Transmission Coordination Arrangement (CTCA)

Regarding the NERC standards, Santee Cooper is registered with NERC as a Balancing Authority (BA), Distribution Provider (DP), Generator Owner (GO), Generator Operator (GOP), Planning Authority/Planning Coordinator (PA/PC), Resource Planner (RP), Reserve Sharing Group (RSG), Transmission Owner (TO), Transmission Operator (TOP), Transmission Planner (TP), and Transmission Service Provider (TSP). As part of this registration, Santee Cooper is required to comply with the NERC Reliability Standards. NERC reliability standards define the reliability requirements for planning and operating the North American bulk power system and are developed using a results-based approach that focuses on performance, risk-management, and entity capabilities. Santee Cooper is assessed on its performance under the reliability standards once every three years by SERC Reliability Corporation, Inc. (SERC). Noncompliance or violations are subject to penalties based on severity and duration. When an organization is in violation of standards, the applicable Regional Entity assesses penalties and monitors approved mitigation plans for compliance.

In response to a FERC and NERC Staff Report describing a January 17, 2018 cold weather event⁵, Southwest Power Pool, Inc. submitted a Standards Authorization Request to the NERC Standards Committee proposing a new standard development project to review and address Recommendation No. 1 in the Report. NERC Project 2019-06 Cold Weather was instituted with the goal of revising three existing NERC Reliability Standards to promote reliability of the Bulk Electric System (BES) during cold weather and to ensure that cold weather plans for BES generating units are developed,

⁵ See FERC & NERC, *The South Central United States Cold Weather Bulk Electric System Event of January 17, 2018* (2019), <https://www.ferc.gov/sites/default/files/2020-04/07-18-19-ferc-nerc-report.pdf>

implemented, and communicated in order to maintain BES generating unit availability within capabilities or operating limitations.⁶ The standards to be revised are EOP-011-2 (Emergency Preparedness); IRO-010-2 (Reliability Coordination Data Specification and Collection); and TOP-003-5 (Operational Reliability Data). On March 22, 2021, the NERC Board of Trustees took action without a meeting to direct the completion of proposed Reliability Standards under Project 2019-06 Cold Weather by June 2021. Santee Cooper has been actively following and participating in this standard development process and balloting since its inception and is taking steps to fully comply with these standard revisions when they are approved and become effective.

Santee Cooper is a party to the VACAR South Reliability Coordination Agreement which established the VACAR South Reliability Coordinator within the SERC region. The VACAR South Reliability Coordinator has decision-making authority to act and direct actions to be taken by Balancing Authorities, Generator Operators, Transmission Operators, Transmission Service Providers, Load-Serving Entities, and Purchasing-Selling Entities within the VACAR South area to preserve the integrity and reliability of the Bulk Electric System within the VACAR South area.

Santee Cooper is also a member of the VACAR Reserve Sharing Group (VRSG). The VRSG agrees to maintain certain levels of reserves and commit those reserves to other members when needed. Reserves are allocated among the members based on a formula

⁶ See Project 2019-06 Cold Weather, NERC, <https://www.nerc.com/pa/Stand/Pages/Project%202019-06%20Cold%20Weather.aspx> (last visited May 13, 2021). The NERC Board of Trustees has scheduled a public meeting for June 11, 2021 for the purpose of adopting the standard documents arising out of Project 2019-06 Cold Weather and authoring NERC Staff to file the proposed standards with applicable regulatory authorities, including FERC.

that considers each member's largest unit and previous annual peak demand. When a VRSG member system suffers an emergency loss of capacity, it is immediately eligible to purchase energy from the other VRSG members. Disturbance Control Standard DCS event reporting is structured such that each entity providing reserves during an event share in the recovery responsibility.

In addition, Santee Cooper is a party of the multilateral Regional Equipment Sharing for Transmission Outage Restoration agreement. This program is administered by the North American Transmission Forum (NATF) and is an agreement governing a voluntary initiative among certain electric transmission owners who desire to share spare transformers and other equipment for the purposes of reducing recovery time after a major event or disaster.

Santee Cooper has a long history of cooperation and coordination between customers and neighboring utilities, in the following interrelated settings: (1) at the utility level; (2) at the Sub-regional level (VACAR); (3) at the Regional level, under the auspices of SERC; and (4) between utilities in the region pursuant to ongoing coordinated assessment activities among interconnected utilities. Some of these efforts are further described below.

The Carolina Transmission Coordination Arrangement (CTCA) is a collection of agreements developed concurrently by the Principals, Planning Representatives, and Operating Representatives of multiple two-party Interchange Agreements. The purpose of the CTCA is to coordinate certain transmission-related activities among Duke Energy Carolinas, Duke Energy Progress, Dominion Energy South Carolina, and Santee Cooper. Activities may include investigating and evaluating the bulk electric system performance

of the interconnected CTCA systems; developing study scopes for assessments to be conducted; reviewing and approving study reports prepared; and establishing study groups, working groups, subcommittees, or task forces as needed.

Santee Cooper participates in the South Carolina Regional Transmission Planning (SCRTP) process along with Dominion Energy South Carolina. This process is established to meet the transmission planning requirements of FERC Order 890, 890-A, and 890-B. Santee Cooper's Bulk Power Marketing area assists in identifying impact studies for importing and exporting energy in future years during summer and winter seasons.

Santee Cooper is a member of the Eastern Interconnection Planning Collaborative (EIPC). The members of the EIPC are entities listed on the NERC compliance registry as Planning Authorities and represent the majority of the Eastern Interconnection. The EIPC provides a grass-roots approach which builds upon the regional expansion plans developed each year by regional stakeholders in collaboration with their respective NERC Planning Authorities. This approach provides coordinated interregional analysis for the entire Eastern Interconnection guided by the consensus input of an open and transparent stakeholder process.

Santee Cooper, as a Transmission Planner/Planning Coordinator, participates in the SERC Engineering Committee (EC) Long-Term Working Group (LTWG). This group maintains power flow models and conducts longer term intra-regional reliability assessment studies. Additionally, Santee Cooper participates in the SERC EC Near-Term Working Group. This group conducts near-term intra-regional seasonal reliability studies.

This group is also responsible for building Open Access Same-Time Information System (OASIS) study models.

Assessment of Current Utility Processes and Systems to Withstand Potential Ice

Storms and other Winter Conditions

In this section, Santee Cooper describes the exercises of utility plans, processes, and infrastructure to determine if current utility preparedness plans ensure utility service meets peak customer demand under extreme scenarios, as well as areas of improvement and steps taken to address areas of improvement.

Santee Cooper performs various annual training events to validate its existing emergency action plans, processes, and procedures. In addition to internally developed and executed efforts, Santee Cooper also participates in regional and national external training events. Such training events include:

- ✓ Annual Emergency Action Plan Drill
- ✓ Biennial GridEx National Event
- ✓ Emergency Action Plan for Dam Failure
- ✓ VACAR South Reliability Coordinator Annual Restoration Drill
- ✓ CIP-008 Incident Response Drill

Through these training events, procedures, plans, and processes are evaluated through after-action assessments and updated as needed to document Santee Cooper's reliability and response to events.

In addition to training, Santee Cooper has experienced many actual cold weather events as well as hurricanes in recent years. Through these events, procedures, plans, and processes have been executed, reviewed after-the-fact, and improved. This is evident in Santee Cooper's reliability record of serving firm load through all events. Through these efforts, restoration time after hurricane events has reduced significantly. For example,

Santee Cooper's generating stations have not experienced a forced outage or derating due to winter weather in the previous six years. Much of this result is due to the implementation of lessons learned from the Polar vortex of 2014 as described in the following section.

Identification of Best Practices, Lessons Learned and Challenges to Utility Service

Santee Cooper has had an opportunity to activate its EAP at least once a year since 2014. In January 2014, the Polar Vortex extreme cold weather event put Santee Cooper plans and other utilities in the state to the test. In addition to the lessons learned from the 2014 Polar Vortex, Santee Cooper has captured new insights every time it has activated its EAP, allowing it to refine its EAP and document the improvements as part of its plan.

Each time the EAP is activated, Santee Cooper undertakes an after-action review. Recent after-action reviews have reminded Santee Cooper of the criticality of the Energy Control Center's ability to communicate to field crew restoration priorities clearly and promptly. These priorities are informed by system needs and damage assessments. Broadly speaking, lessons learned from after-action reviews include:

- ✓ Bulk transmission must be the priority in any restoration to maintain Santee Cooper's tie to the Interconnection and prevent islanding.
- ✓ Matching load to generation is the next priority *i.e.*, communicating with customers to find load that can be restored quickly to keep generation on-line.
- ✓ Restoring delivery points that suffered the least damage.
- ✓ Restoring all delivery points while sectionalizing problematic line sections.
- ✓ Restoring all remaining line sections.

In addition, these after-action-reviews prompted Santee Cooper, in EAP table top exercises, to focus on areas that involve large amounts of detail or coordination – separate from the main high-level portion of the exercise – with all employees who might be tasked with those responsibilities.

From a distribution perspective, improvements made to the EAP from recent after-action-reviews include:

- ✓ Requesting outside assistance (via contract and mutual aid assistance) as early as possible to ensure adequate resources are available for restoration. Santee Cooper has an umbrella mutual assistance agreement with the American Public Power Association and over 30 bilateral mutual aid agreements with various individual companies. Experience has shown we can organize and direct a maximum of fifty external crews for a large event.
- ✓ Establishing 16-hour shift (6 AM – 10 PM, primary day shift, and 6 PM – 10 AM, skeleton night shift) allowing for quicker restoration by utilizing the majority of workforce during daylight hours while still maintaining a 24-hour availability and response.
- ✓ Centralizing storm center operation allows better resource planning and coordination.
- ✓ Performing biannual contingency studies where Santee Cooper analyzes how to recover from a substation transformer outage at both winter and summer peaks. System hardening when studies indicate possible non-compliance with the NESC standards, to include line and system upgrades as well as load shifting, is recommended when the studies indicate possible violations.
- ✓ Establishing alternate “cold load” relay settings for cases where conductors can be loaded beyond the standard protection settings.

In addition, Santee Cooper has developed a more resilient system as the result of the following improvements:

- ✓ Over the past two decades, Santee Cooper’s distribution system has been hardened by placing a higher percentage of distribution lines underground. The current split is 55% Under Ground (UG) vs 45% Over Head (OH). On a net basis since 2001, the OH system has grown by only 77 miles (6%) while the underground has increased by 781 miles (89%). This is from a combination of new construction and OH-to-UG conversions.
- ✓ The Conservation Voltage Reduction (CVR) system provides the ability to reduce line voltage and therefore feeder and transformer loading. This is a benefit during periods of high loading.
- ✓ Establishing annual pole inspections with danger/reject pole replacement plans.
- ✓ Establishing a 5-year tree trimming schedule.
- ✓ Establishing and testing damage assessment processes.
- ✓ Utilizing drones for line patrols and inspections.
- ✓ Standardizing maintenance initiatives: Substations, lines, pole top equipment, URD equipment, and infrared inspections.
- ✓ Proactively switching on feeders that are subject to loading conditions above 450 amps to ensure reliable service through an event.

- ✓ Monitoring all substation components and initiating alarms; communications monitoring in SCADA.
- ✓ Creating 10-day load projections issued by EMS to anticipate high load days.

At its generating stations, Santee Cooper has improved its winter weather resilience with over \$3 million in freeze protection mitigation projects and other improvements:

- ✓ Constructing additional enclosures surrounding critical process systems and instrumentation
- ✓ Upgrading heat tracing with better monitoring and diagnostic capabilities
- ✓ Creating additional heat tracing circuits on vulnerable components
- ✓ Establishing annual third-party heat tracing audits
- ✓ Implementing of more robust winter weather planning, preparedness, maintenance, and operating procedures

III. Conclusion

Santee Cooper appreciates the opportunity to participate in this proceeding and to provide the information and assessments associated with its operations described in the Commission's March 10, 2021 docket. Although Santee Cooper has a superb track record for planning and responding to extreme cold weather events, Santee Cooper seeks continual improvement in its operations to achieve a high level of service for its customers and the people of South Carolina.

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Moncks Corner, South Carolina

June 11, 2021

BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA
DOCKET NO. 2021-66-A

June 11, 2021

IN RE:)	
)	
South Carolina Office of Regulatory Staff's)	
Motion to Solicit Comments from Utilities and)	CERTIFICATE OF
Other Interested Stakeholders Regarding)	SERVICE
Measures to Be Taken to Mitigate Impact of)	
Threats to Safe and Reliable Utility Service)	

The undersigned employee of the South Carolina Public Service Authority ("Santee Cooper") does hereby certify that she has caused to be served upon the person(s) named below the Initial on behalf of Santee Cooper in the foregoing matter via electronic mail as follows:

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Dates this 11th Day of June 2021.

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